The University Of Jordan
Faculty Of Medicine

Nerves of the Upper limb

By
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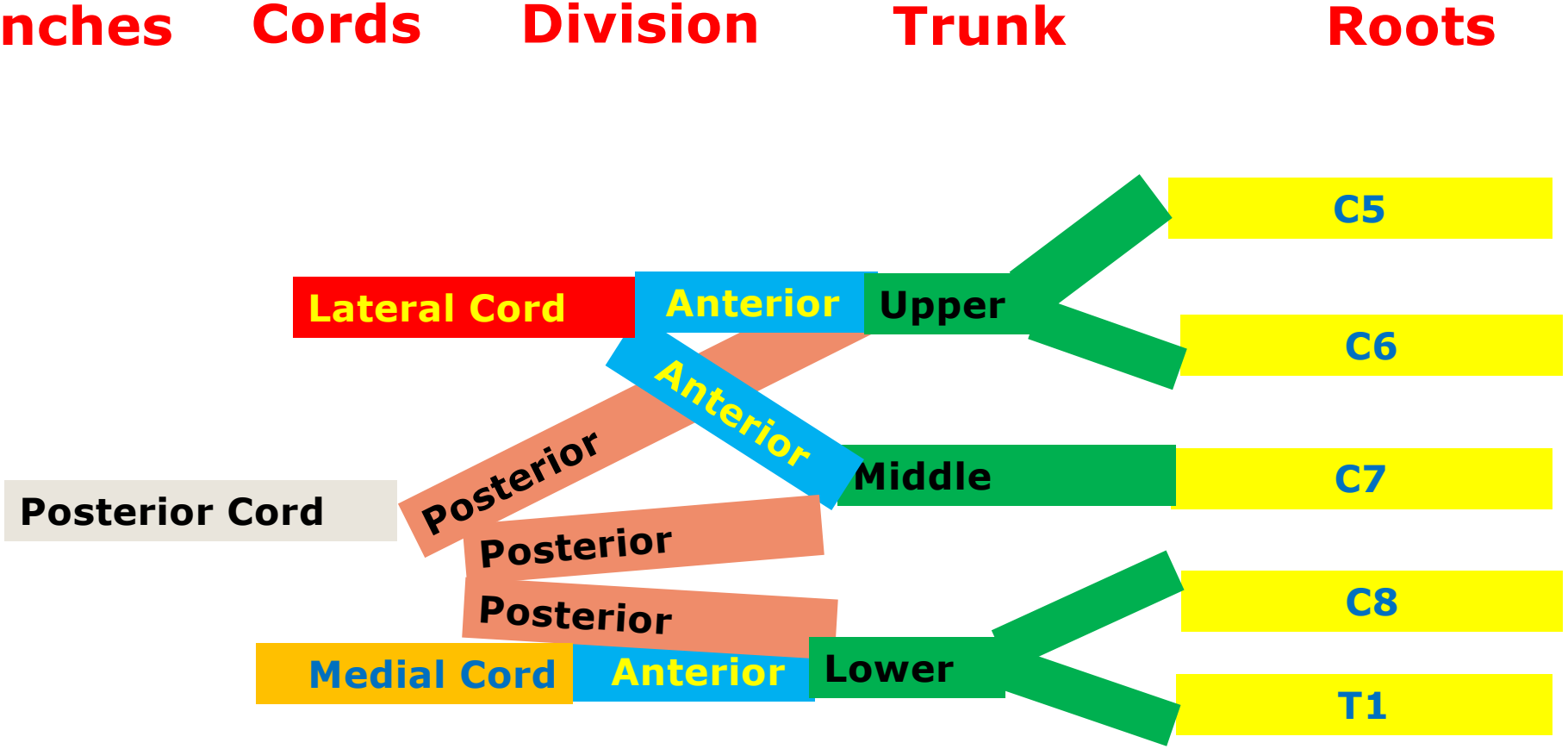
Associate Professor of Anatomy


Branches
Cords
Division
Trunk
Roots
Lateral Cord
Anterior
Upper
C5
C6
Anterior
Posterior
Middle
C7
Posterior Cord
Posterior
Posterior
C8
Medial Cord
Anterior
Lower
T1

Lateral cord	Medial cord
1-Lateral Pectoral nerve (C5,C6 & C7)	1-Medial Pectoral nerve (C8 & T1)
2-Lateral root of Median nerve (C5,C6 & C7)	2-Medial root of Median nerve (C8 & T1)
3- Muscul***cutaneous*** nerve (C5,C6 & C7)	3-Medial ***cutaneous*** nerve of the arm (C8 & T1)
	4-Medial ***cutaneous*** nerve of the forearm (C8 & T1)
	5-Ulnar nerve (C7,C8 & T1)

Branches from the Posterior Cord of the Brachial Plexus

1-Upper subscapular nerve (C5 & C6)

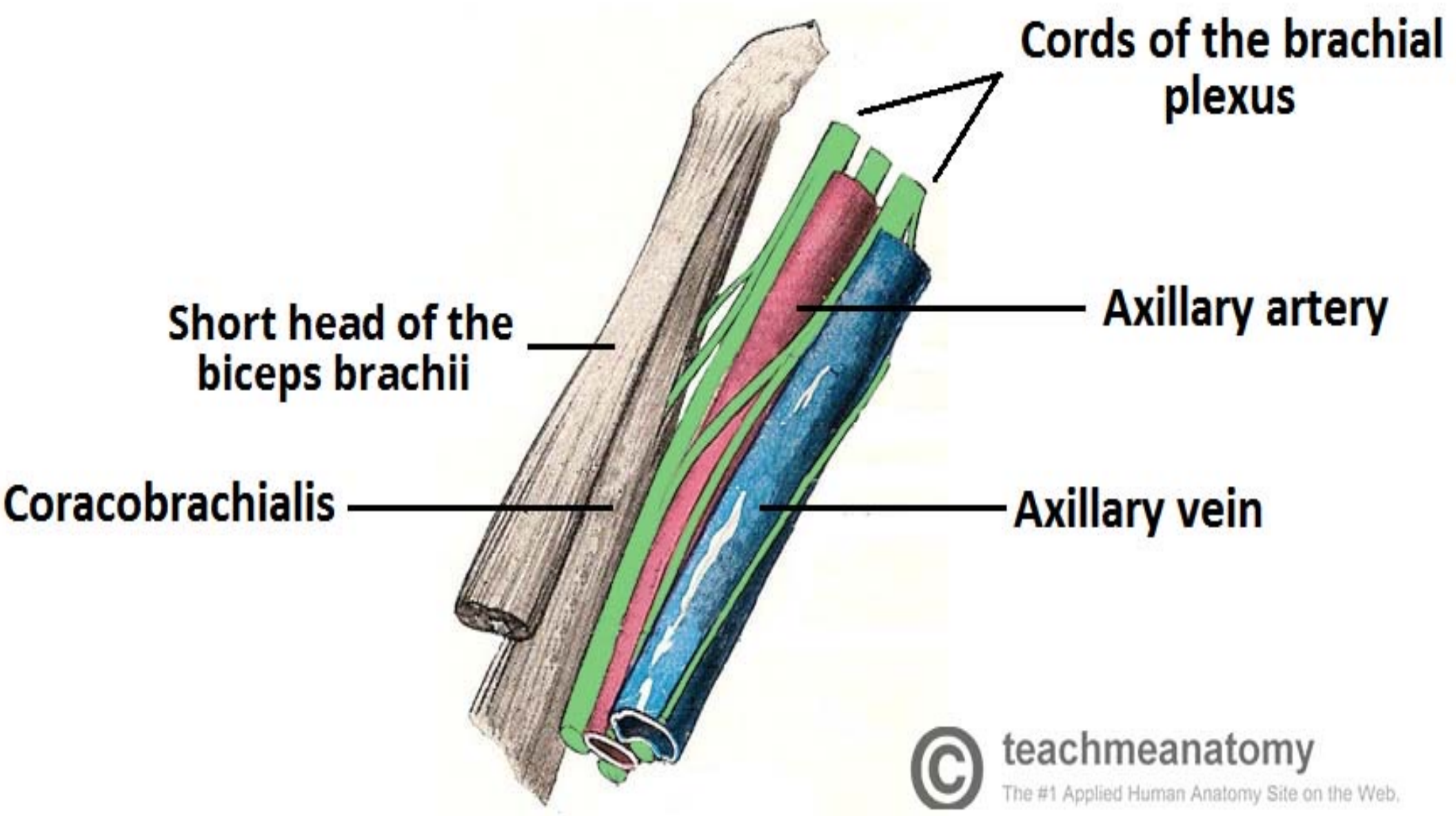
2-Lower Subscapular nerve (C5 & C6)

3-Axillary nerve (C5, & C6)

4-Thoracodorsal nerve (C 6,7 & 8)

5-Radial nerve (C5,6,7,8 & T1)

- The cords are related to 2nd part of axillary artery
- The branches are related to 3rd part of axillary artery



Sensory Nerve supply of the hand

Ulnar nerve

Palmar and dorsal aspect medial 1/3 of the palm.

Palmar and dorsal aspect of medial 1½ fingers .

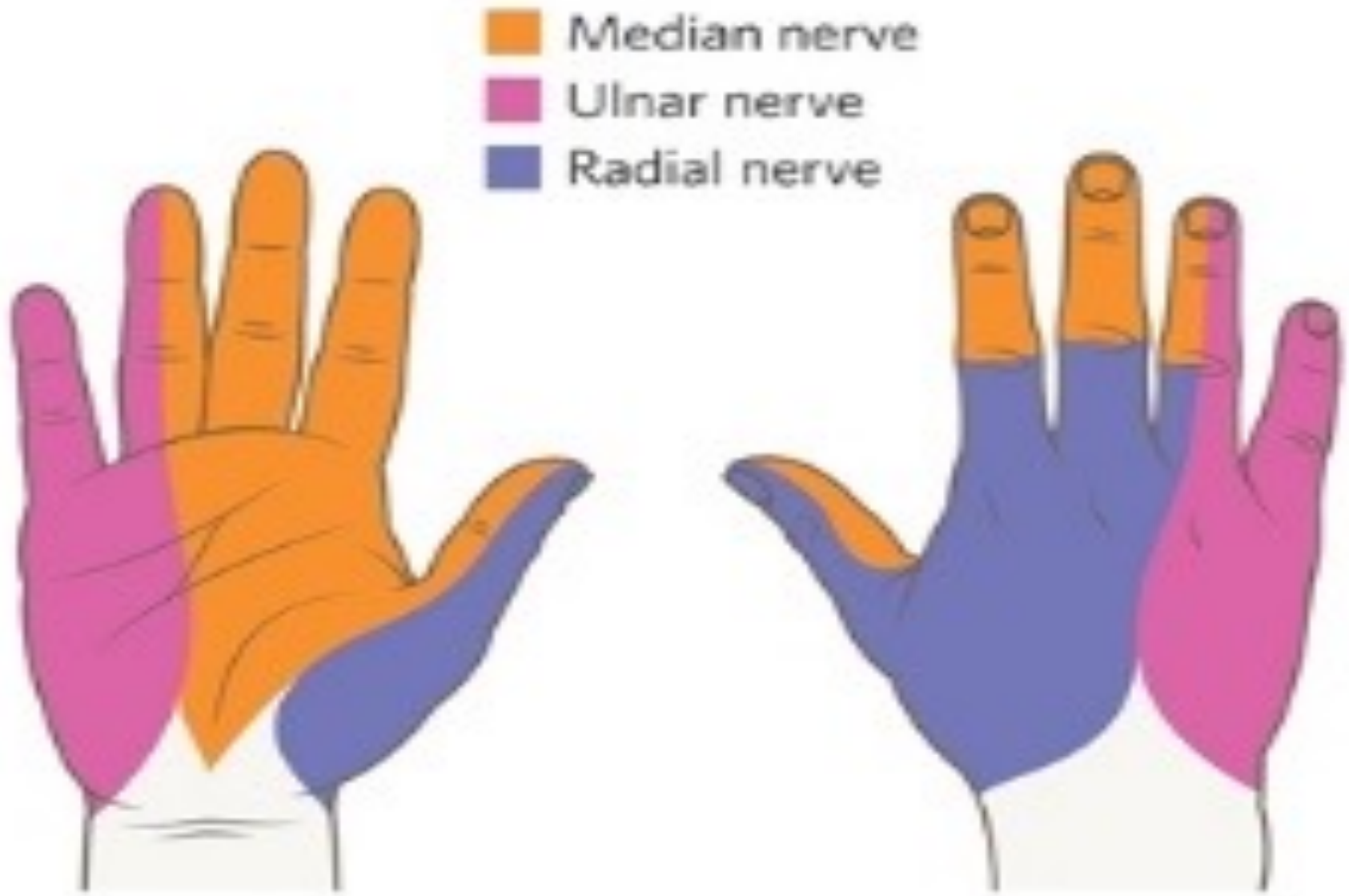
Median Nerve

Palmar aspect lateral 2/3 of the palm

Palmar aspect of lateral 3½ fingers and the skin on the back of the distal phalanges (nail bed) and back of the middle phalanges.

Radial nerve

It is sensory to dorsal aspect of lateral 2/3 of hand and lateral 3 ½ fingers



Sensory Nerve supply of the hand

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Ulnar Nerve

Course and Relations of Ulnar Nerve

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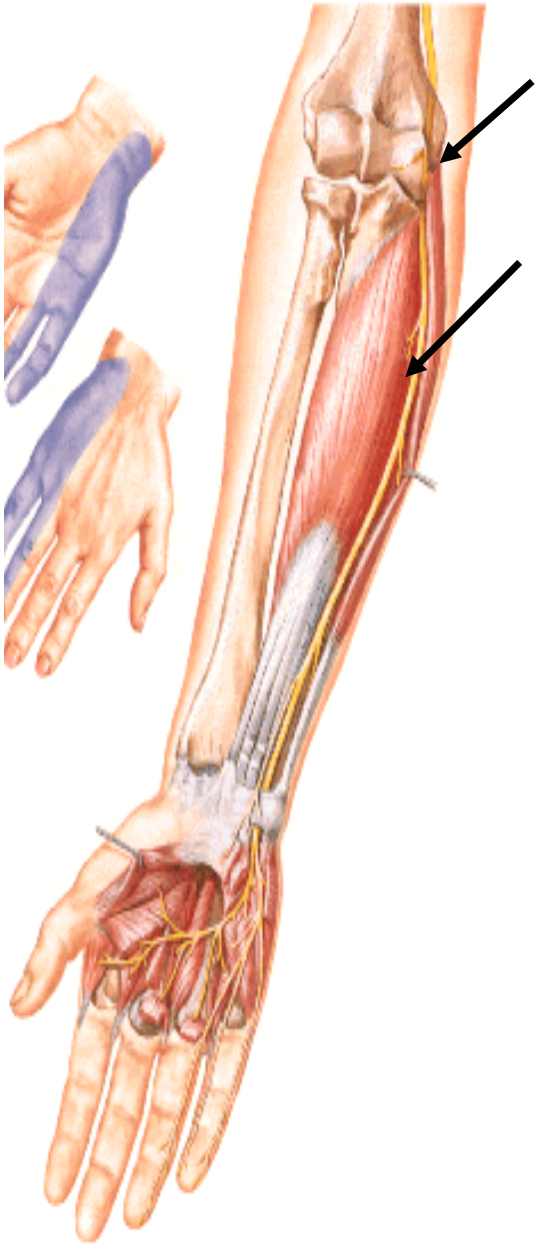
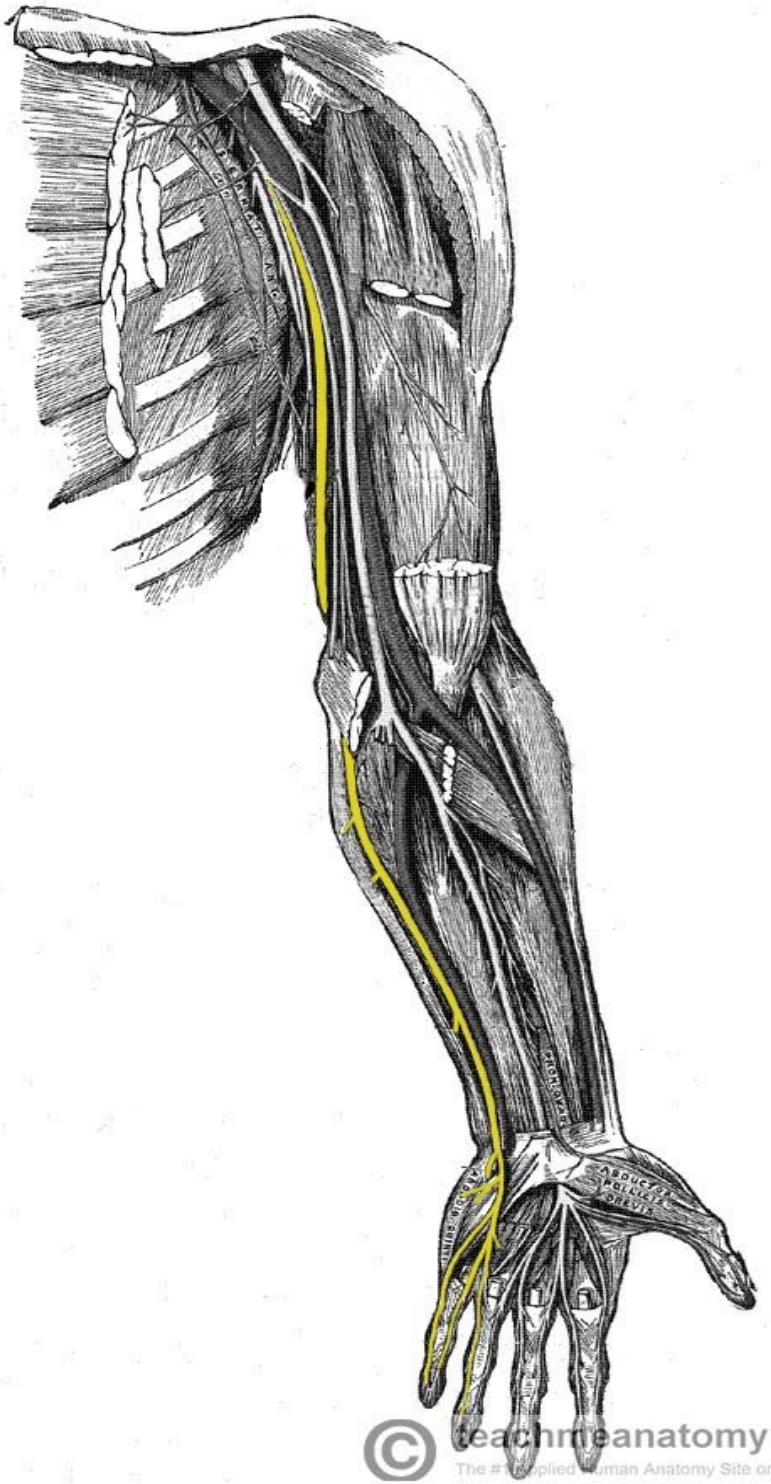
Important relations

- **At the Axilla :** It passes medial to 3rd part of axillary artery
- **At the arm :** It passes medial to brachial artery
- **At the Elbow :** It passes behind medial epicondayle in the cubital tunnel
- **At the Forearm :** It passes between Flexor flexor carpi ulnaris and Flexor digitorum profundus.
- **At the wrist :** It enters hand superficial to flexor retinculum
- **Hand :** It divided into superficial and deep branches within Guyon's (ulnar) canal



Medial Epicondyle

Ulnar Nerve



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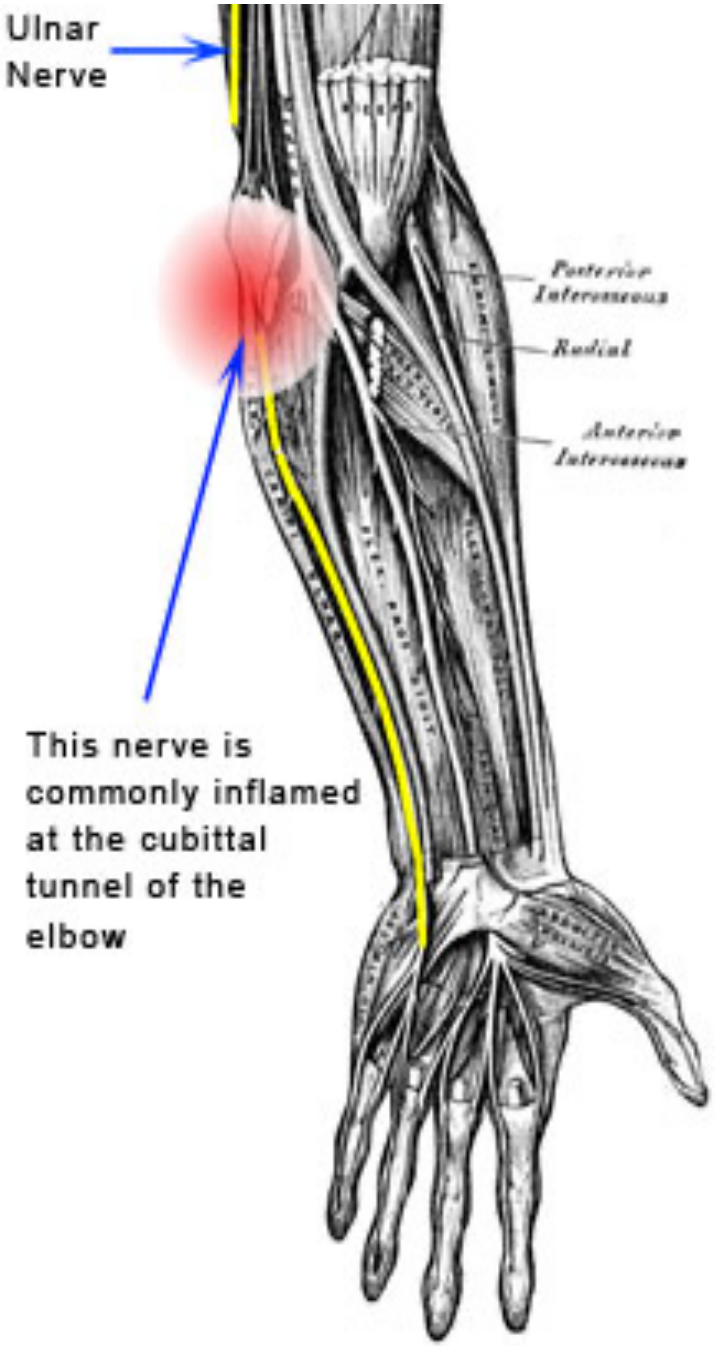
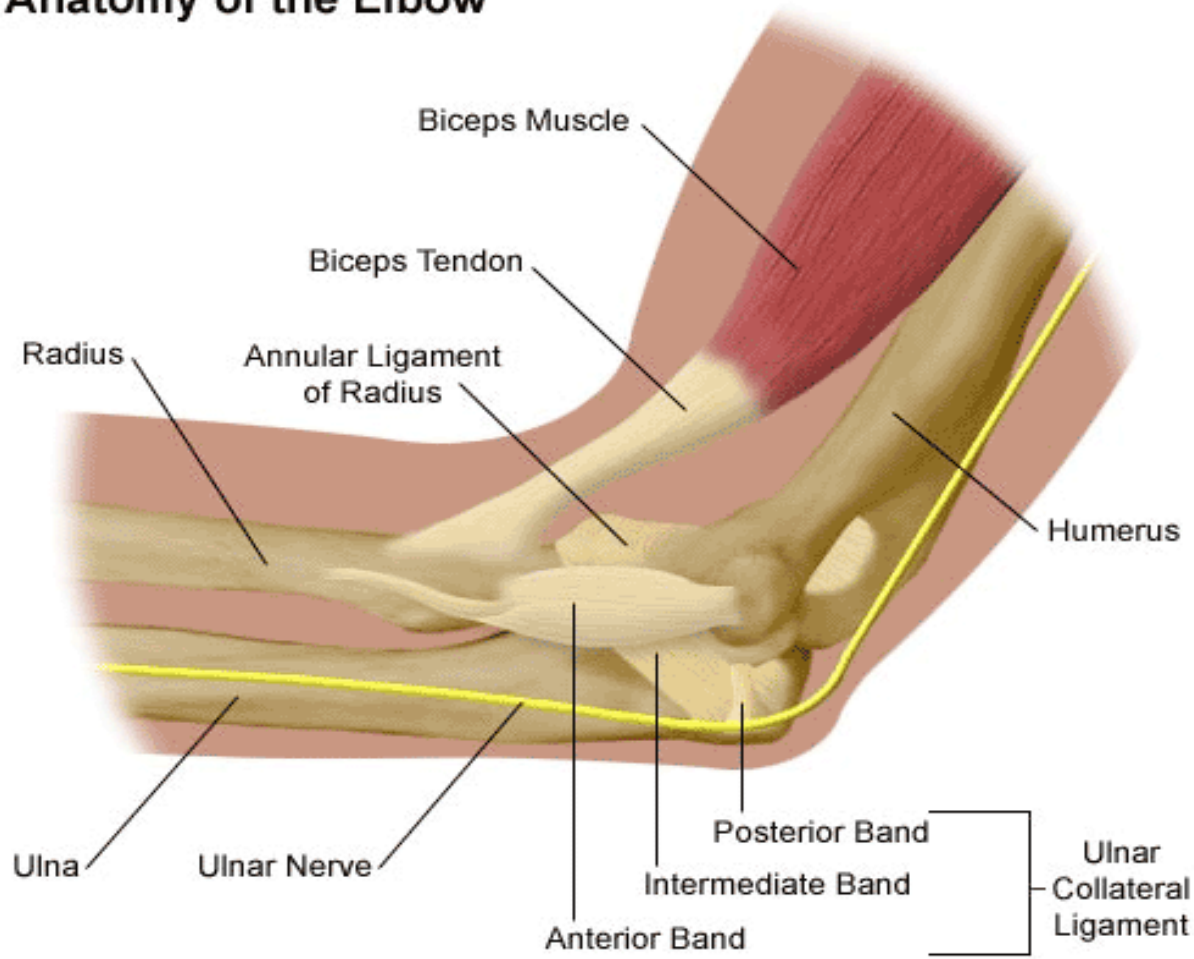


Anatomy of the Elbow



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Branches of Ulnar Nerve

	Motor	Sensory	Articular
Arm	**No Branches**		
Forearm	1-Flexor carpi ulnaris 2-Medial half of flexor digitorum profundus (4rd and 5th fingers)	**Palmar branch** : medial 1/3 of the palm. **Dorsal branch**: medial 1/3 of the dorsum of the hand and the dorsum of the medial 1½ fingers	Elbow joint.
Hand	-Muscles of hypothenar eminence -3rd and 4th lumbricals -Adductor pollicis. -All interossei (palmar and dorsal). -Palmaris brevis muscle	Palmar aspect of medial 1½ fingers .	Wrist joint and metacarpophalangeal joints

Ulnar nerve Injury

A- Causes

Lesion at the elbow:

1. Fracture of the medial epicondyle of the humerus.
2. Cubital Tunnel Syndrome (compression of ulnar nerve within cubital tunnel)

Lesion at the wrist:

Cuts and stab wounds.

B-Manifestation :

1- Weak flexion at the wrist with radial deviation and flattening of the medial side of the forearm.

2- Inability to adduct thumb

3-Inability to adduct or abduct medial four fingers

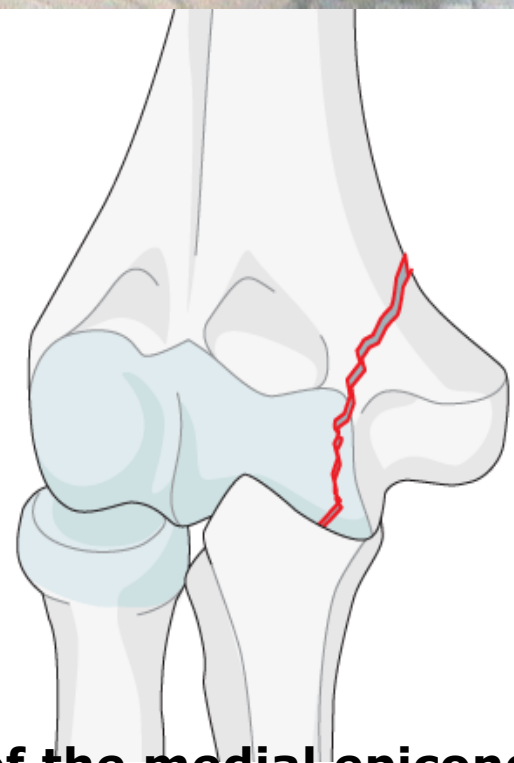
4-Loss of sensation from the palmar and dorsal aspects over the medial 1/3 of the hand and the medial 1½ fingers.

C-Deformity:

Partial claw hand

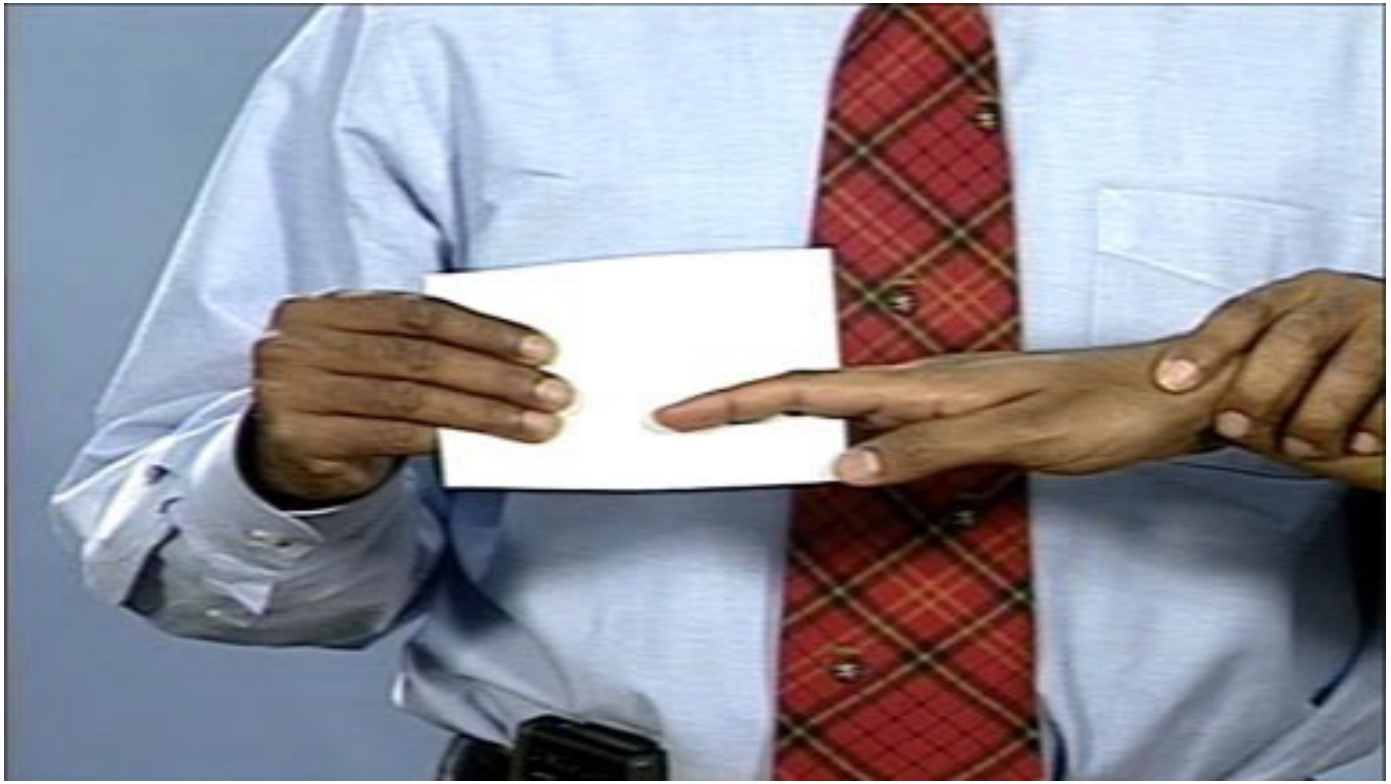
Deformity

Partial claw hand deformity



Fracture of the medial epicondyle

Test for Ulnar nerve Injury

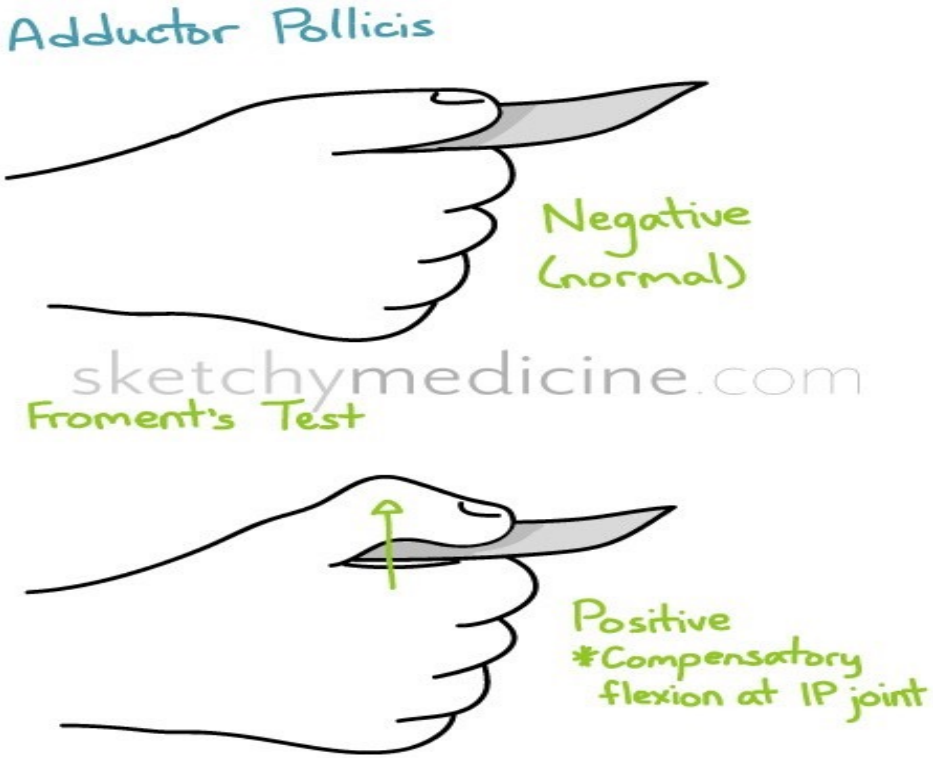


Adduction and abduction of the fingers

Froment's Sign

The patient is asked to make a strong pinch between the thumb and index finger and grip a flat object paper between the thumb and index finger

https://www.youtube.com/watch?v=yJTIhm1VfSI



Ulnar Canal Syndrome

Cause : compression of the ulnar nerve within the ulnar(Guyon's) canal.

Clinical features

Sensory : Pain and paraesthesia ulnar1 1/2 digits (palmar aspect)

Motor:

- Weakness of thumb adduction (adductor pollicis)
- Weakness of finger abduction and adduction (interossei)
- Weakness of little finger flexion, abduction and opposition (hypothenar muscles)

What the difference between Cubital Tunnel and Ulnar Canal Syndromes

Median Nerve

Median Nerve Course and Relations

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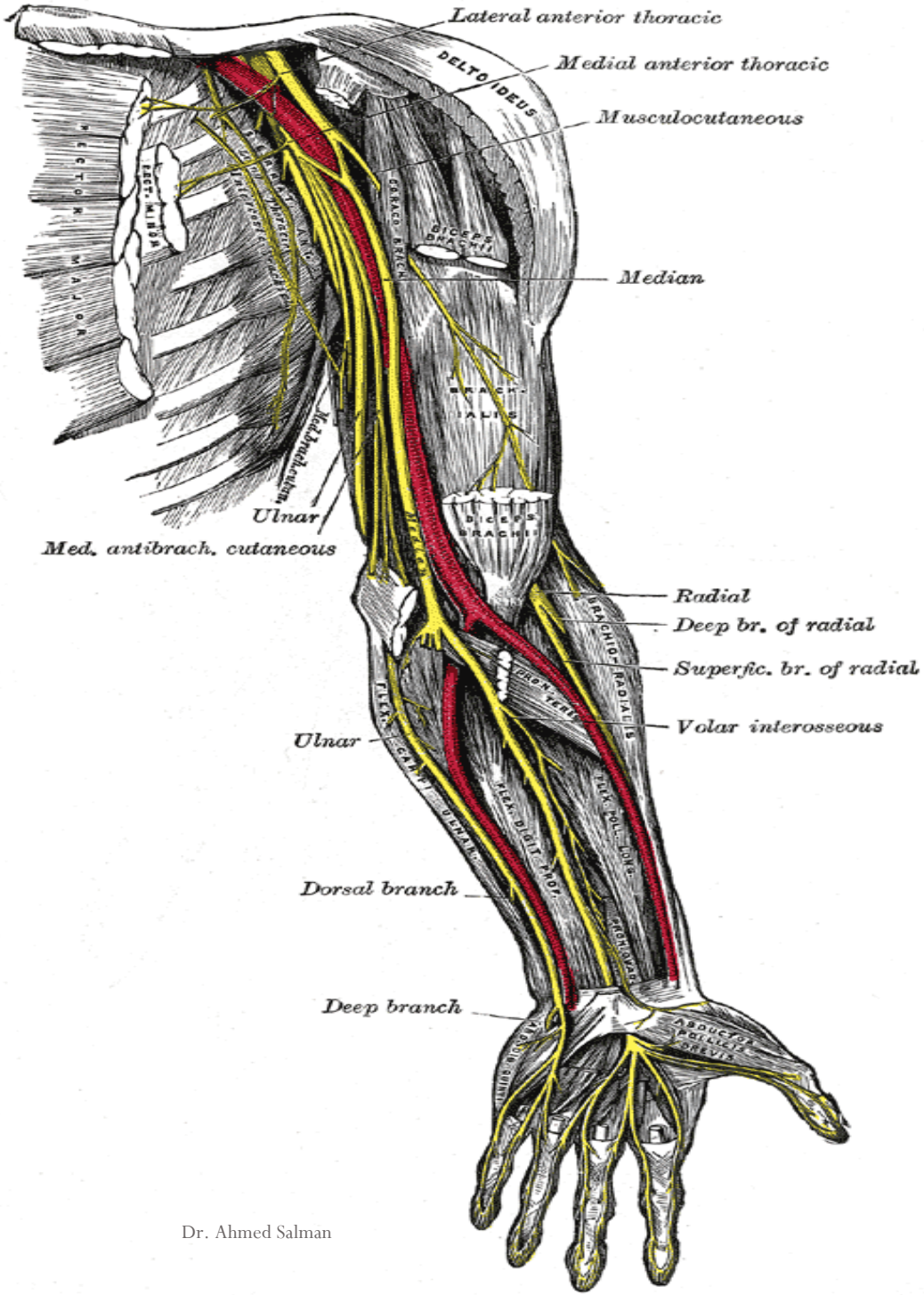
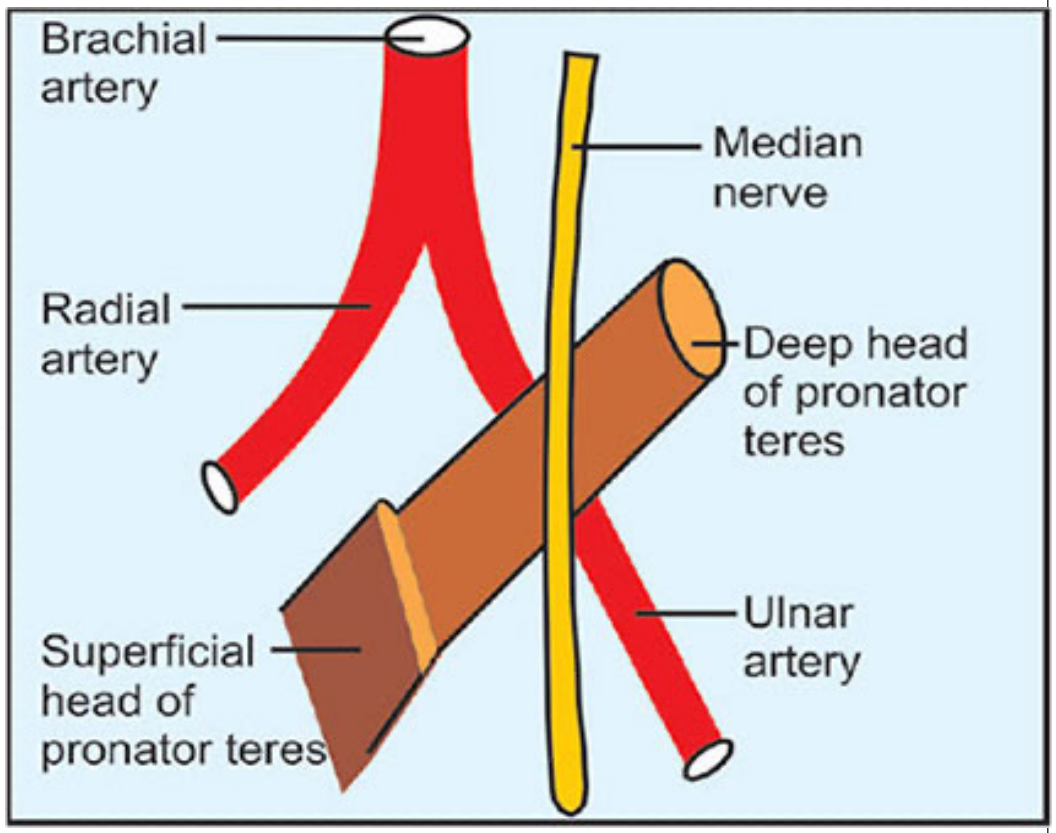
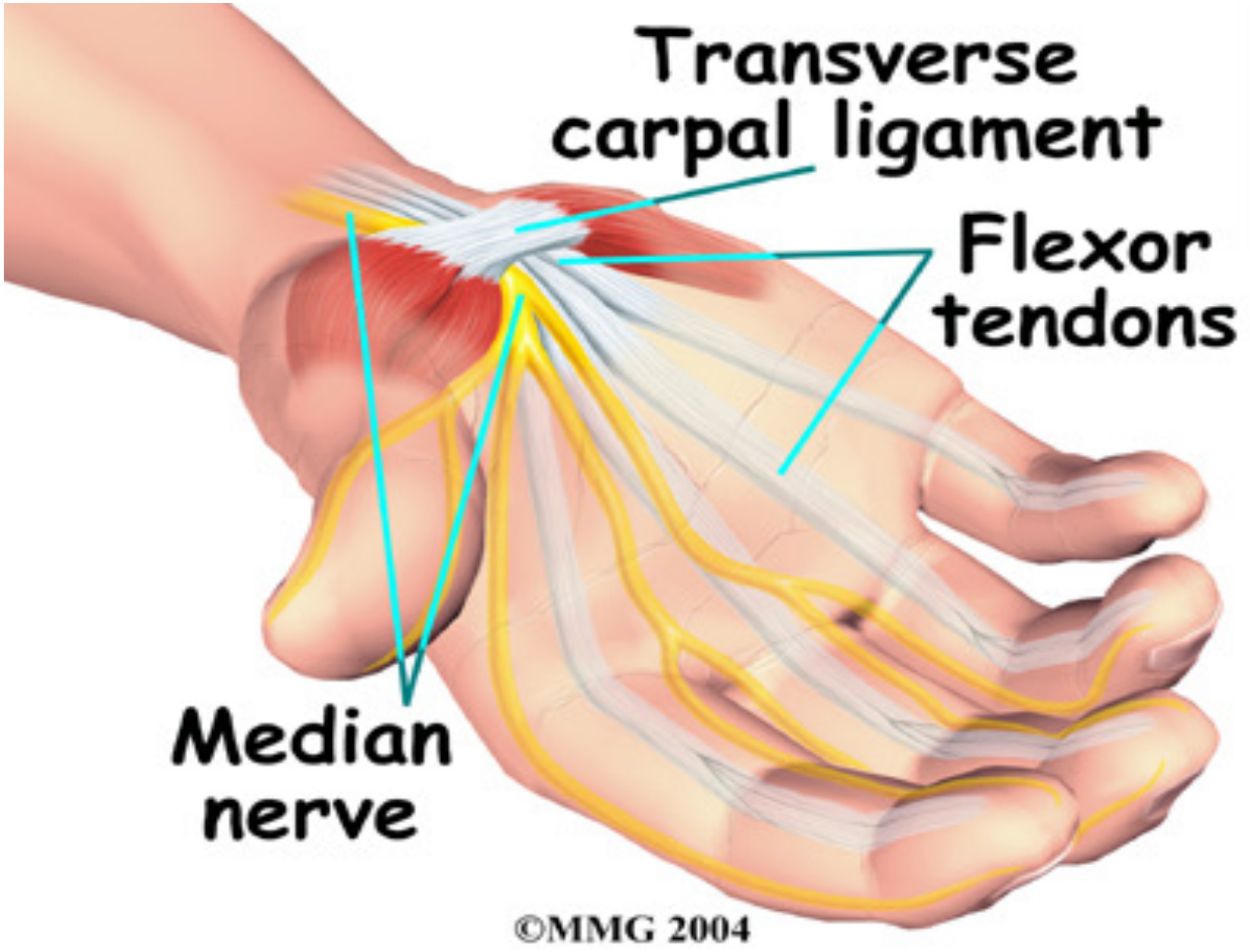
- **At the Axilla :** It passes lateral to 3rd part of axillary artery
- **At the arm :** It passes lateral then medial to brachial artery **(LAM)**
- **At the Elbow :** It passes between superficial and deep head of pronator teres
- The deep head of pronator teres separates **median nerve** from **ulnar artery**
- **At the forearm :** It passes between Flexor digitorum Superficialas and Flexor digitorum profundus.
- 2 inch above the wrist it is coved with skin only **(dangerous site)**
- **At the wrist :** It passes in the carpel tunnel below flexor retinaculum


Lateral anterior thoracic
Medial anterior thoracic
Musculocutaneous
Median
Ulnar
Med. antibrach. cutaneous
Radial
Deep br. of radial
Superfic. br. of radial
Volar interosseous
Ulnar
Dorsal branch
Deep branch


Brachial artery
Median nerve
Radial artery
Deep head of pronator teres
Ulnar artery
Superficial head of pronator teres

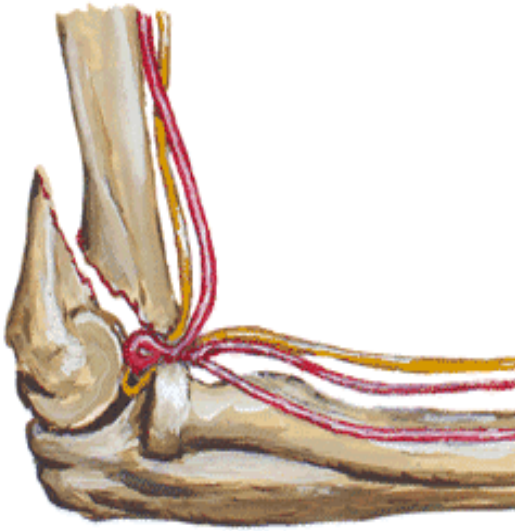

Transverse carpal ligament
Flexor tendons
Median nerve
©MMG 2004

Branches of Median Nerve

	Motor	Sensory	Articular
Arm	**No Branches**		
Forearm	1-To all the superficial flexors of the forearm **EXCEPT** flexor carpi ulnaris 2- Anterior interosseous nerve to all deep flexor muscles **EXCEPT** medial half of flexor digitorum profundus	**Palmar branch** : Lateral 2/3 of the palm. ***(It passes superficial to flexor retinculum)***	Elbow and superior radioulnar joints
Hand	-Thenar Muscles -1st &2nd lumbricals	Palmar aspect of Lateral 3½ fingers and supply the skin on the back of the distal phalanges (nail bed) and back of the middle phalanges.	Wrist joint and metacarpophalan geal joints

Median Nerve injury

Causes



Above the elbow:

Fractures of the lower end of the humerus.

Above the wrist :

Stab wound, broken glass and butcher's knife.

B-Manifestation :

1- Loss of pronation

2-Inability to flex thumb

3-Inability to oppose thumb

4-Loss of sensation

- Over the lateral 2/3 of the palm .
- The palmar surface of the lateral 3½ fingers and

over their distal part on the dorsal surface

C-Deformity:

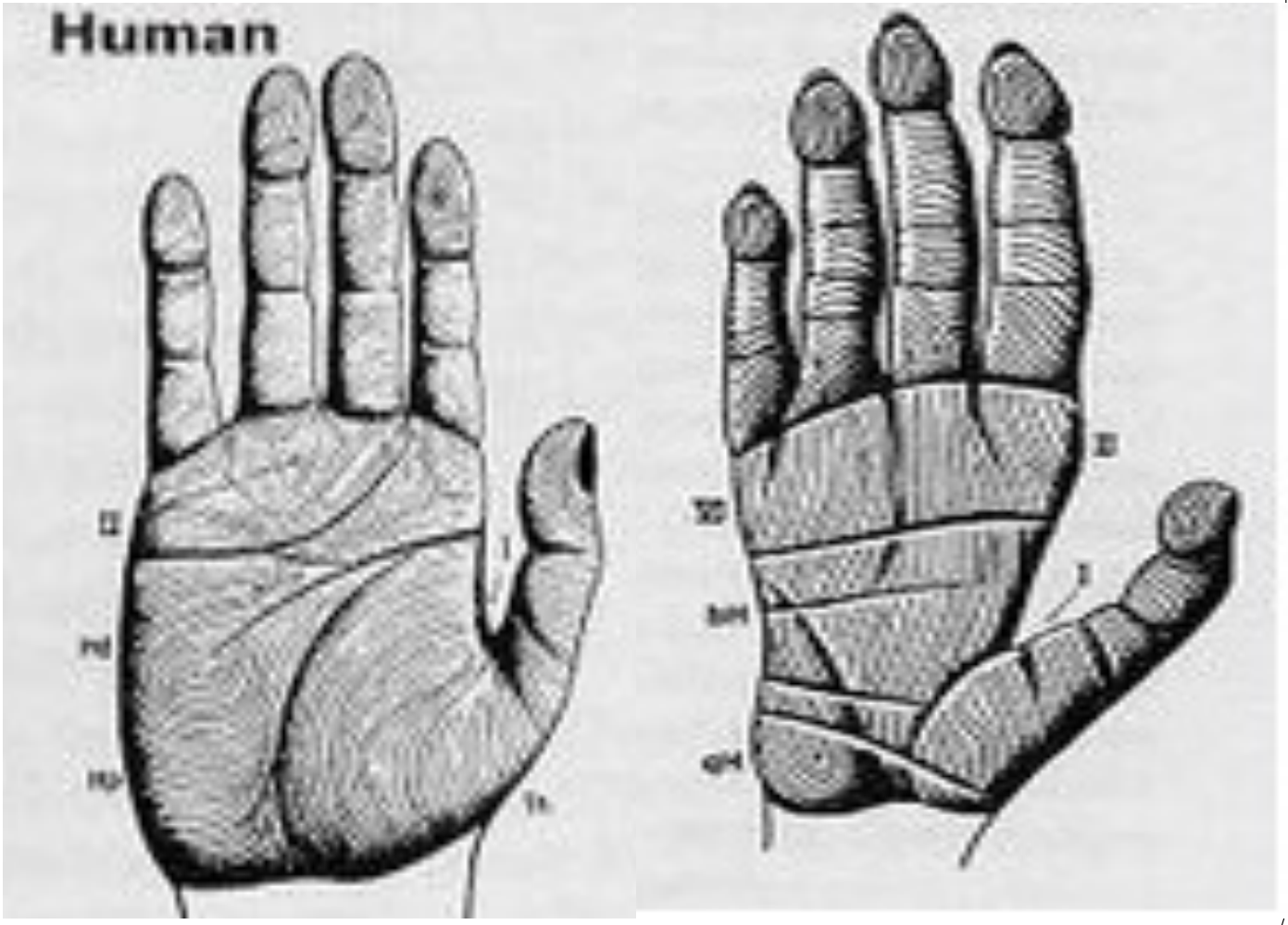
Ape like hand

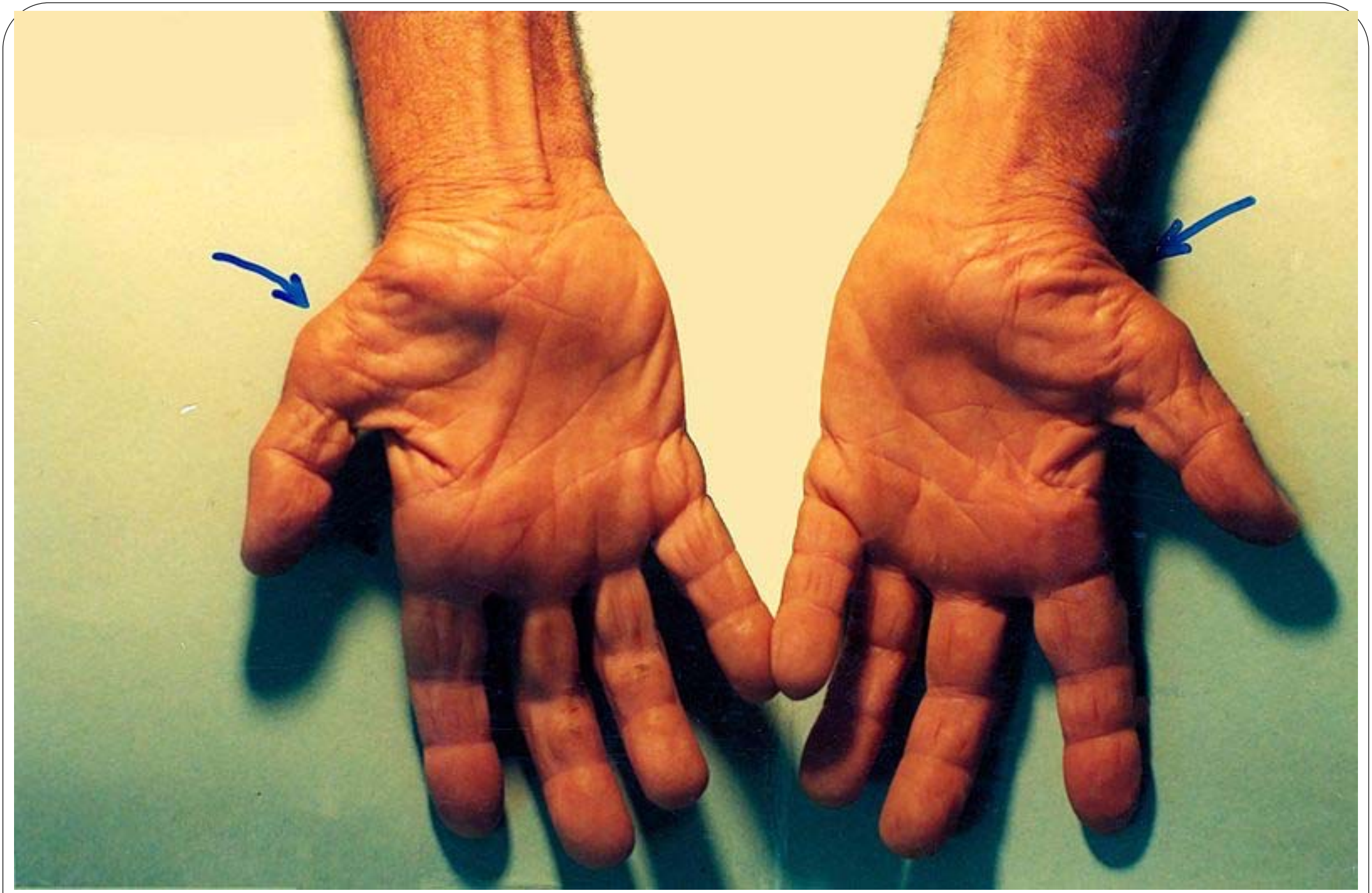
Deformity: (Ape like hand)

The thenar eminence is flattened.

The thumb is extended and laterally rotated and is adducted

Ape Hands





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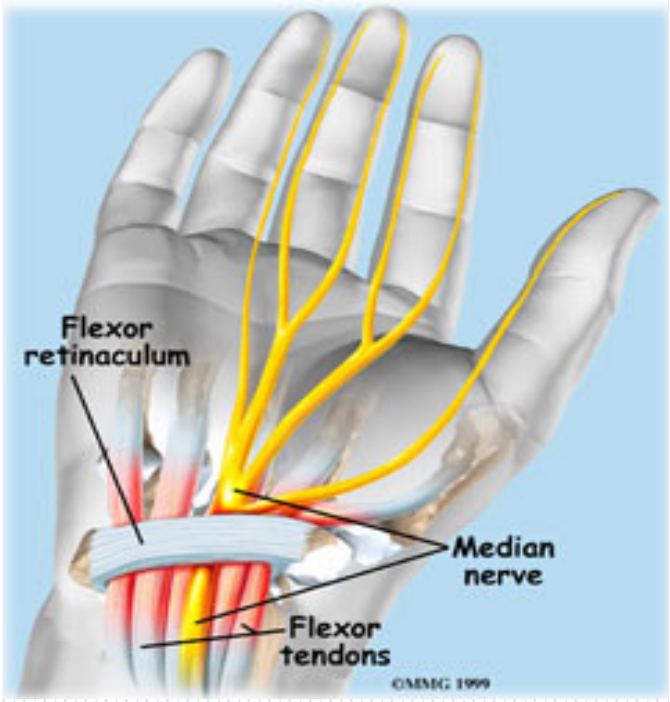
Carpal Tunnel Syndrome



Causes:

Compressing the median nerve in the carpal tunnel.

Results:

- Numbness along the distribution of median nerve to the lateral 3½ fingers.
- Sensory loss (paraesthesia) on palmar surface of the lateral 3½ fingers and extends on dorsal aspect of the distal & middle phalanges.
- Weakness and flattening of muscles of the thenar eminence.
- **The lateral 2/3 of the palm not affected ?? WHY**

Deformity:

Monkey's hand (Ape hand).

Phalen's test

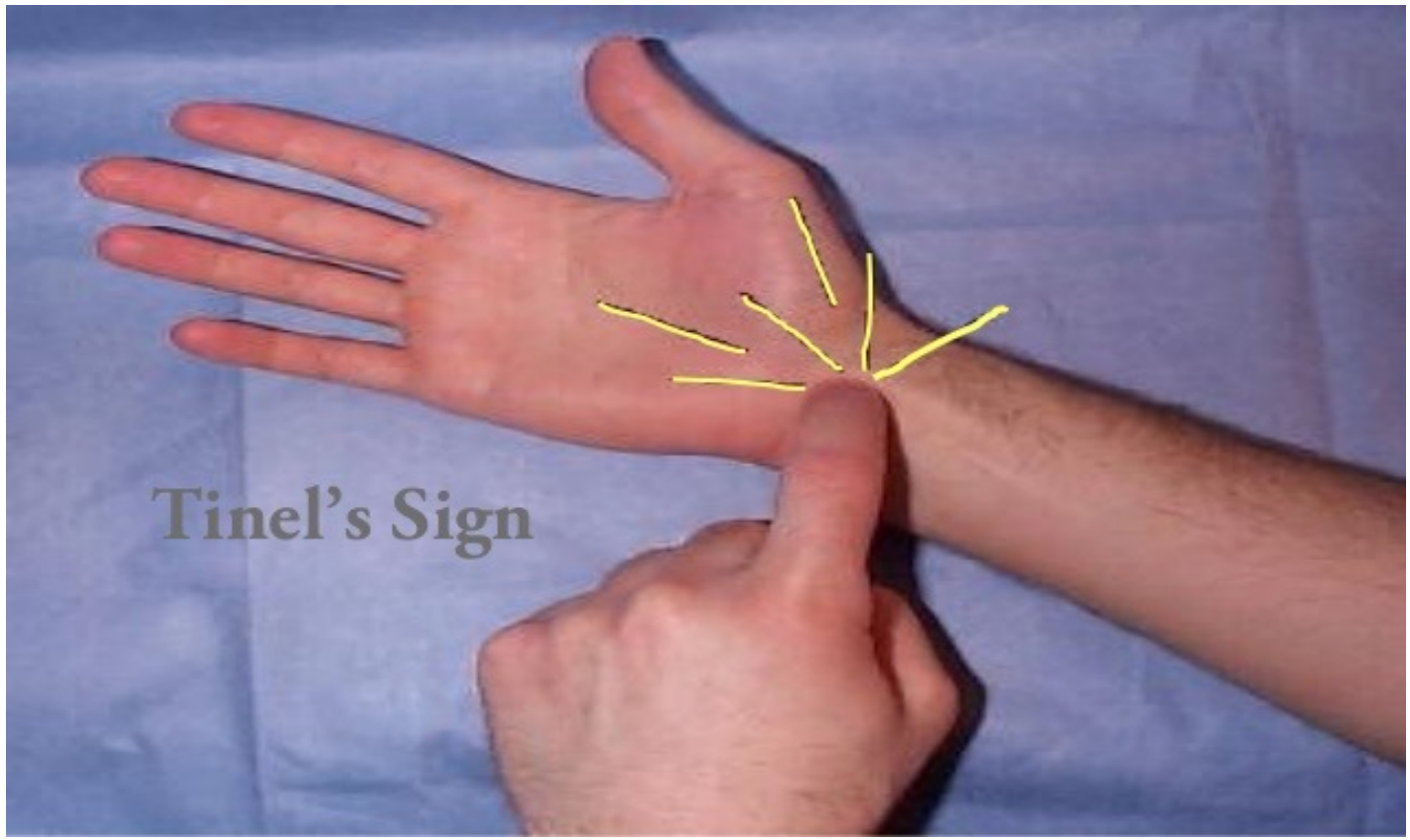
your doctor will ask you to press the back of your hands and fingers together with your wrists flexed in completion and your fingers pointed down. You will stay in that position for at least one or two minutes. If your finger develops a tingle or gets numb, then you have carpal tunnel syndrome.

Tinel’s sign

READ ONLY

It is a tingling or “pins and needles” feeling you get when the doctor taps the skin over a nerve.

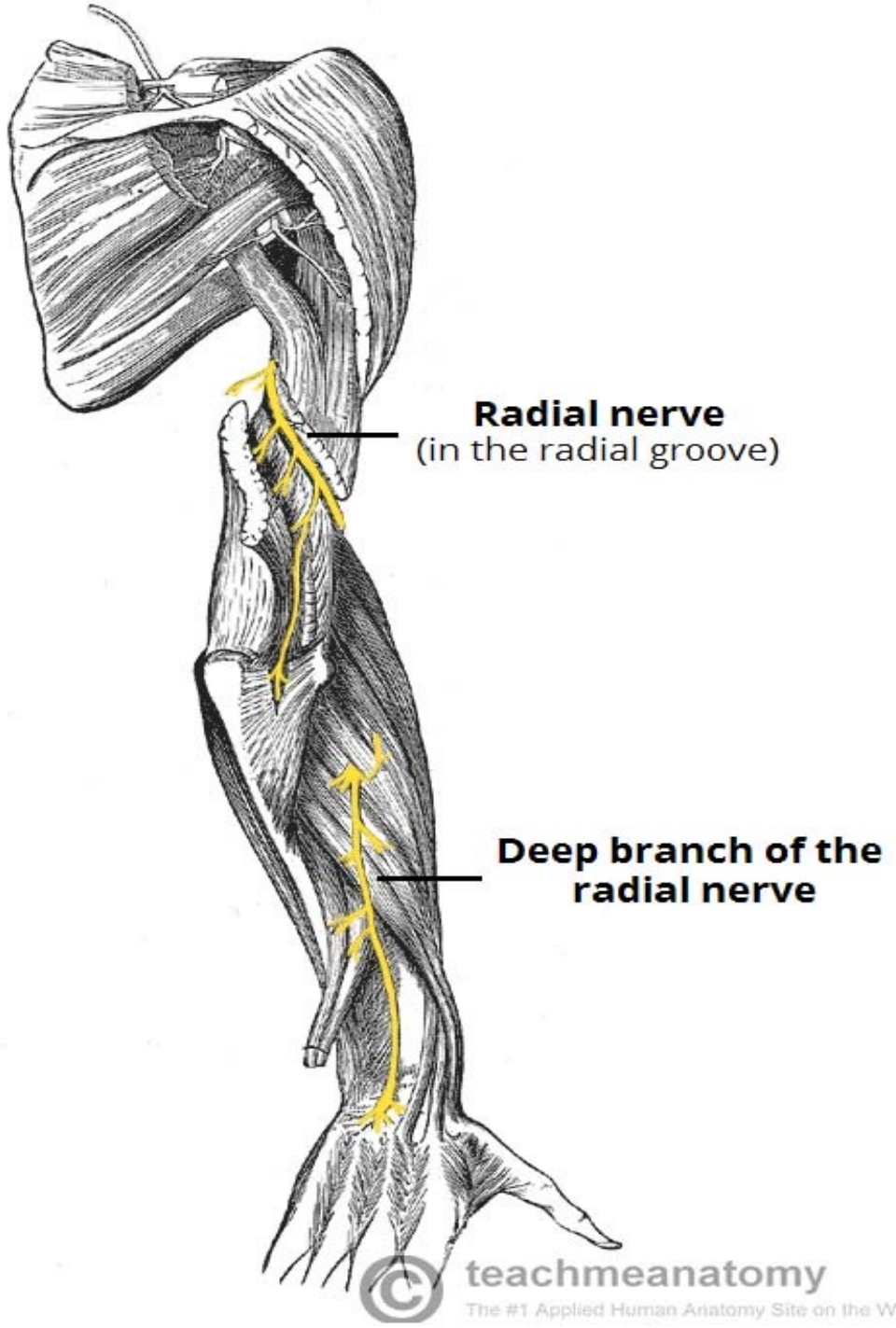
Tinel’s sign may be an indicator that you have nerve compression or damage where they’re tapping.



Radial Nerve

- **At he Axilla :** It passes posterior to 3rd part of axillary artery .
- **At the arm** it descends in the spiral grove with profunda brachii artery
- **At the elbow :** It divides in front of the lateral epicondyle into superficial and deep terminal branches.

Radial N.



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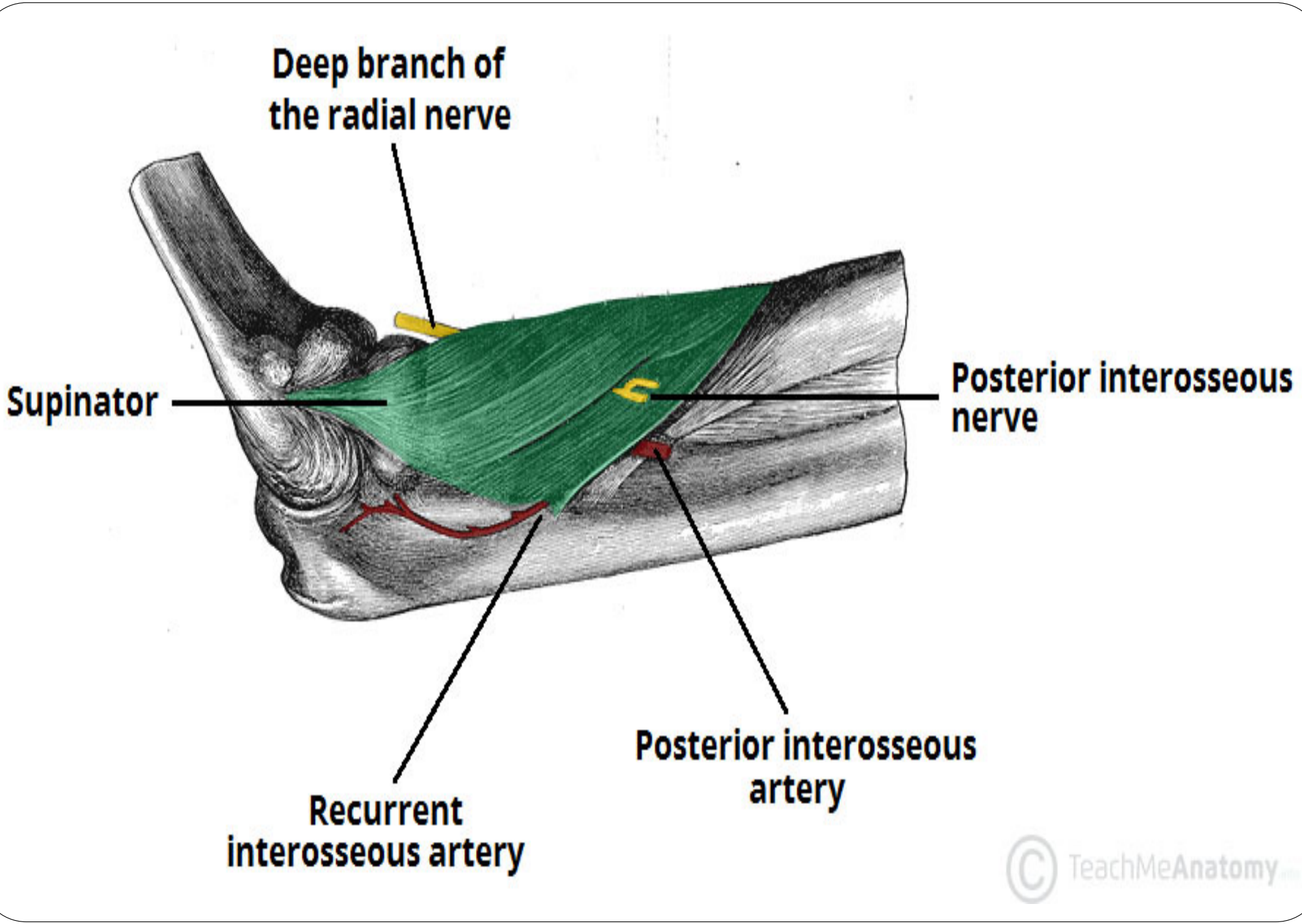
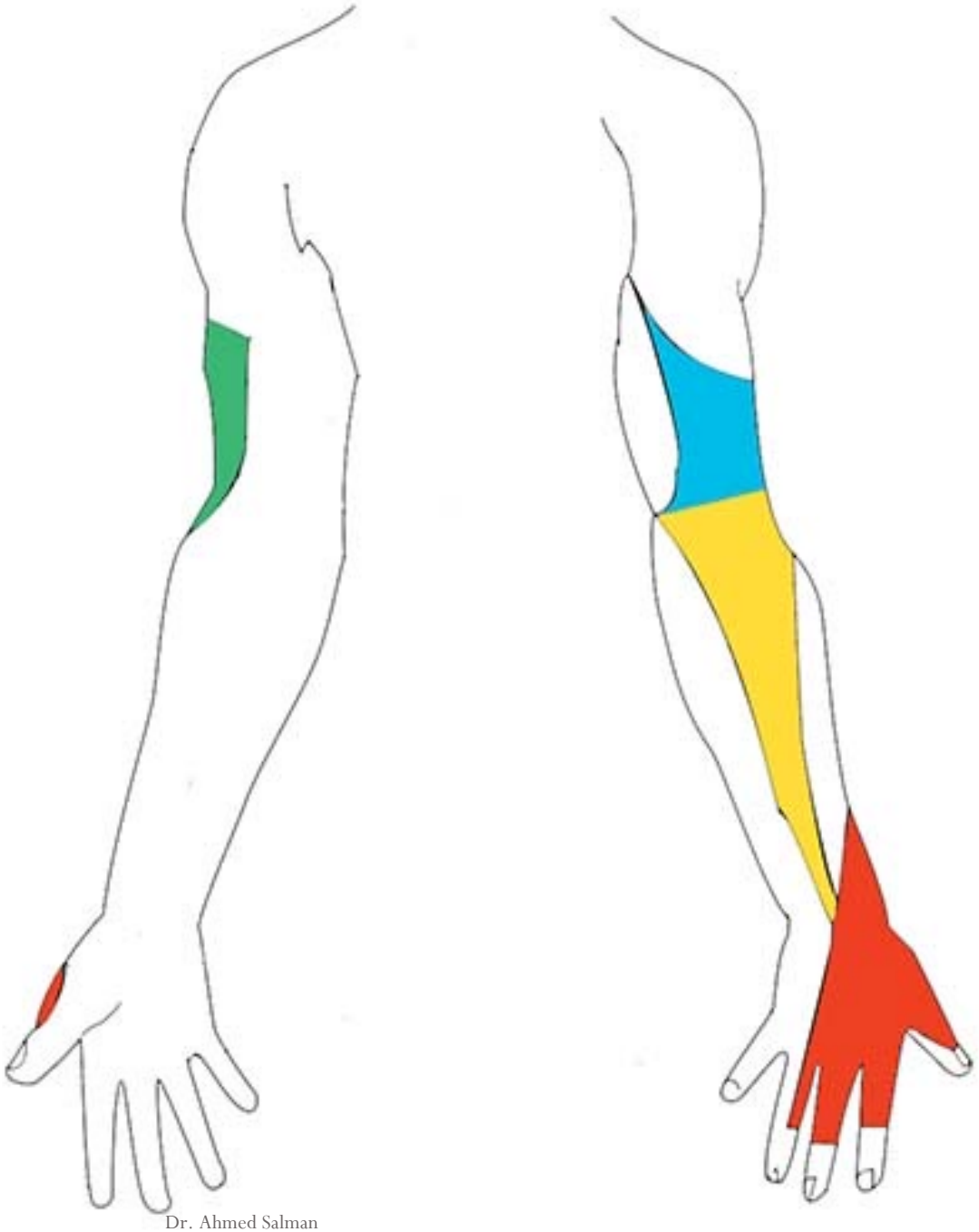
Branches of Radial Nerve

Motor	Sensory
1-Triceps. 2-To the lateral fibres of brachialis. 3-To the brachioradialis. 4-To the extensor carpi radialis longus 5-Nerve to anconeus ***Deep branch*** (posterior interossous nerve) supplies ALL the muscles of the back of the forearm(except anconeus)	1-**Posterior** cutaneous nerve of the **arm** 2-Lower **lateral** cutaneous nerve of **the arm.** 3-**Posterior** cutaneous nerve of the **forearm.** ***4-Superficial branch*** It is sensory to dorsal aspect of lateral 2/3 of hand and lateral 3 ½ fingers


Deep branch of the radial nerve
Supinator
Posterior interosseous nerve
Recurrent interosseous artery
Posterior interosseous artery
© TeachMeAnatomy



Lower lateral cutaneous nerve of arm

Posterior cutaneous nerve of arm

Posterior cutaneous nerve of forearm

Superficial branch

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Radial Nerve Injury

A-Causes

1- Drunken person falling asleep with one arm over the back of a chair (**Saturday night's palsy or sleep palsy**).

2-Fracture of the shaft of the humerus.

2-Using a tourniquet to the arm for a long time.

B-Manifestation :

1-Loss of extension of the elbow joint , wrist and fingers.

C-Deformity:

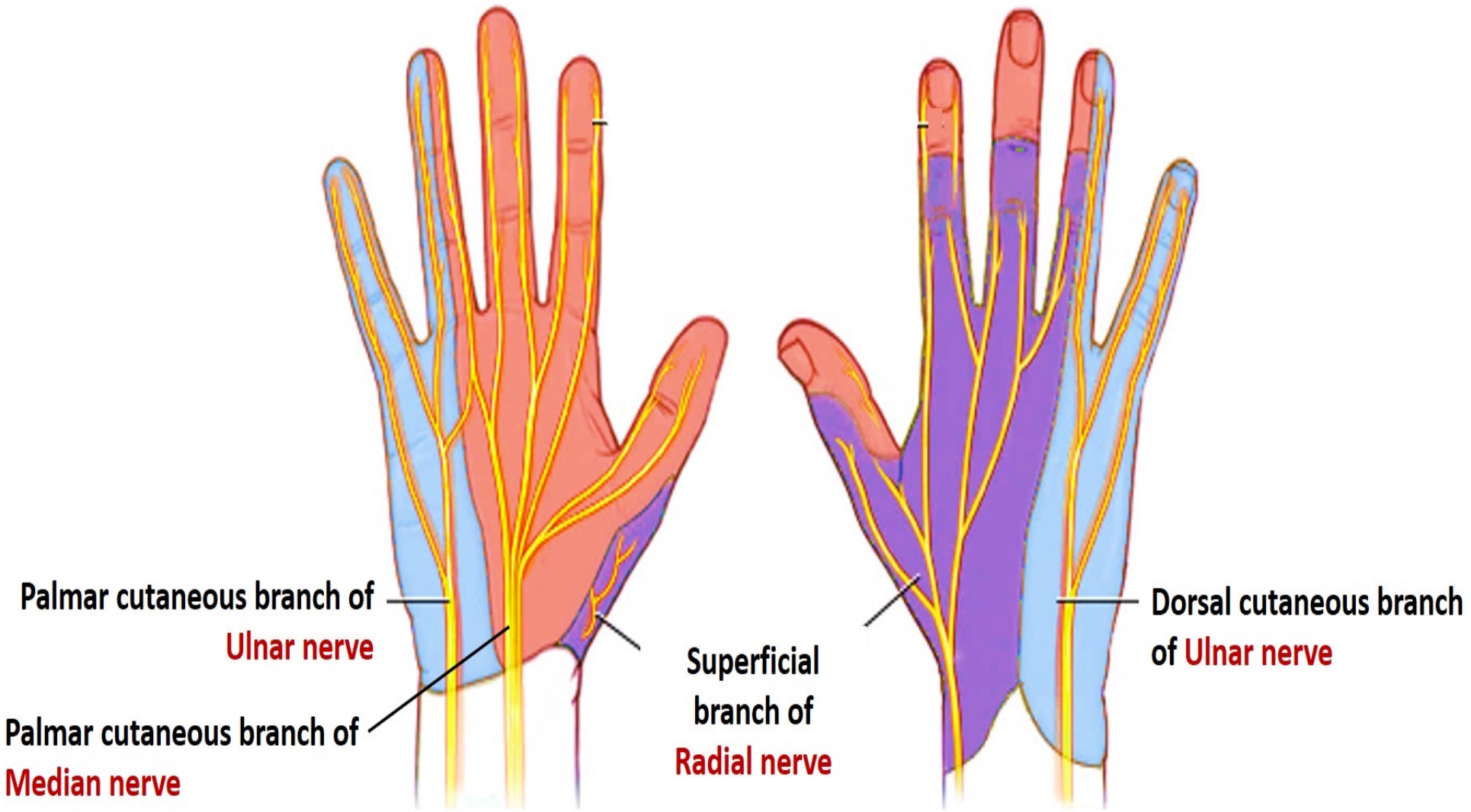
Wrist drop

Fracture Mid-Shaft Of The Humerus

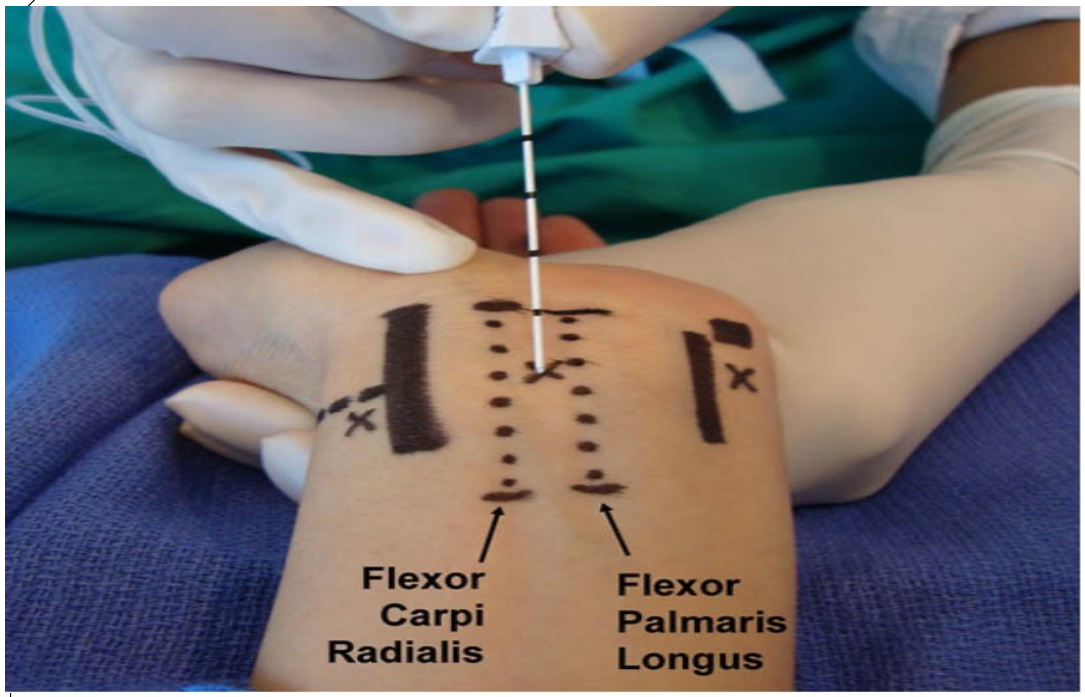
X-Ray Fracture Mid-Shaft Of The Humerus

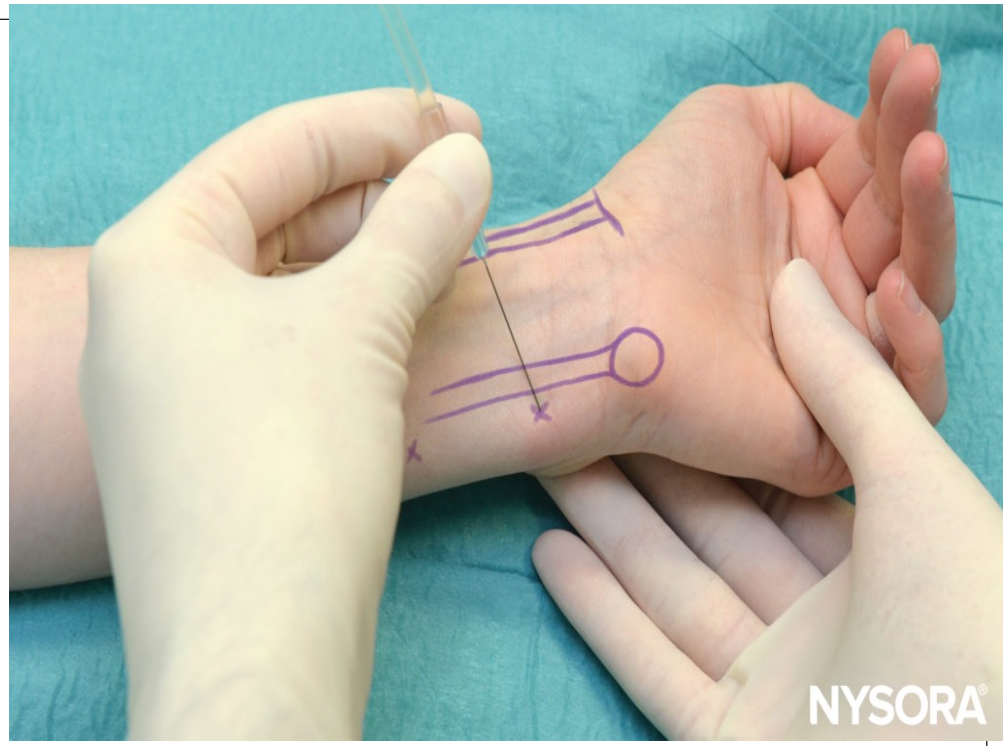
Saturday Night Palsy

Cutaneous Innervation of Hand

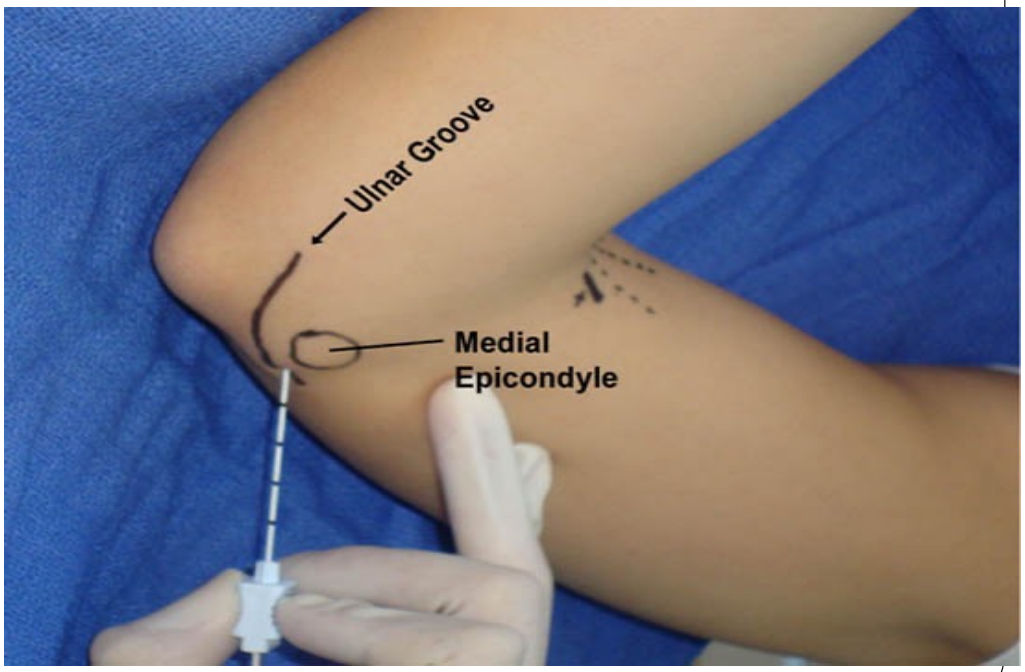


Fingers Nerve block





Median Nerve block



Ulnar Nerve block

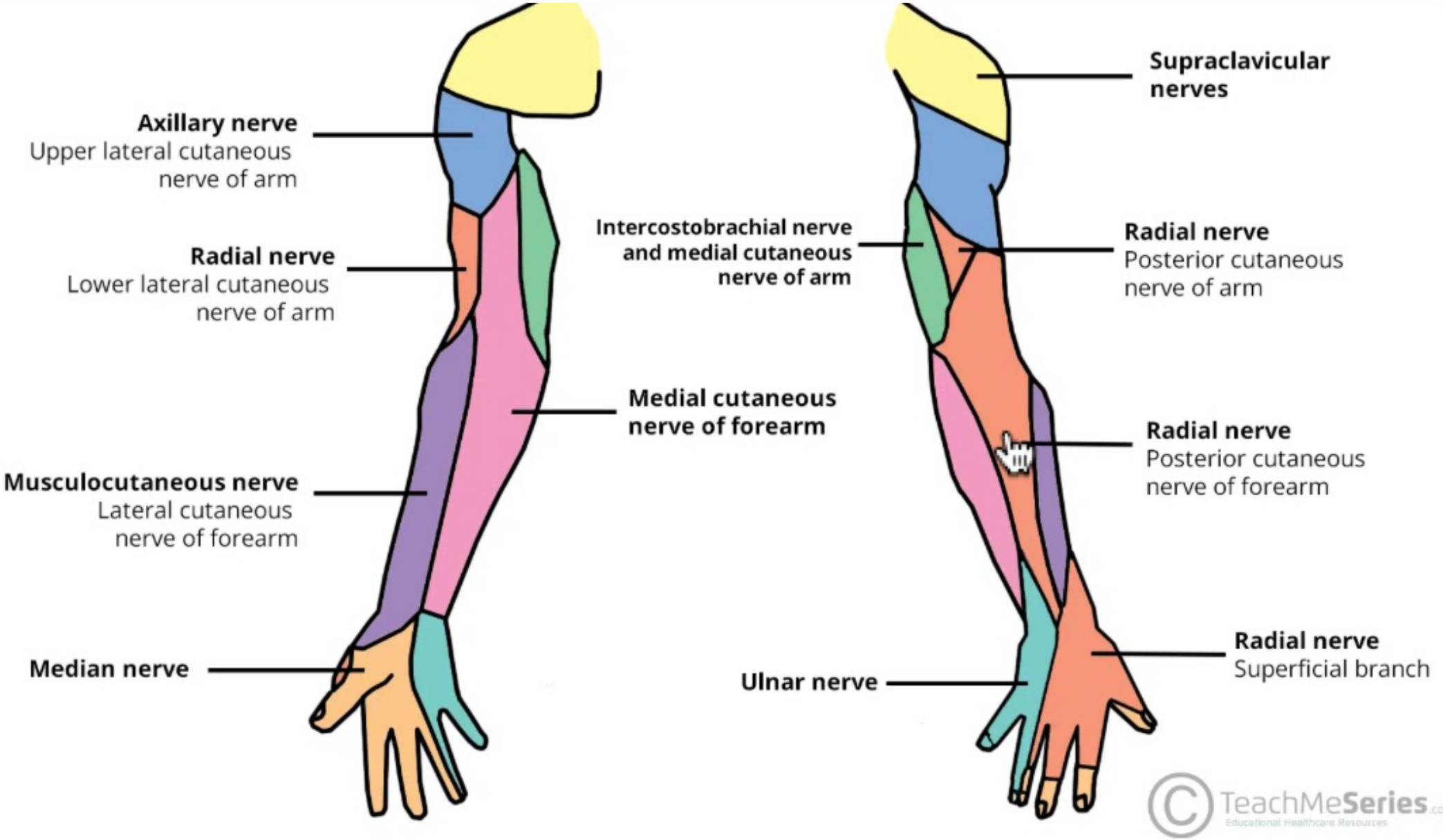


Fig 1

Peripheral nerve cutaneous innervation to the upper limb

Axillary Nerve

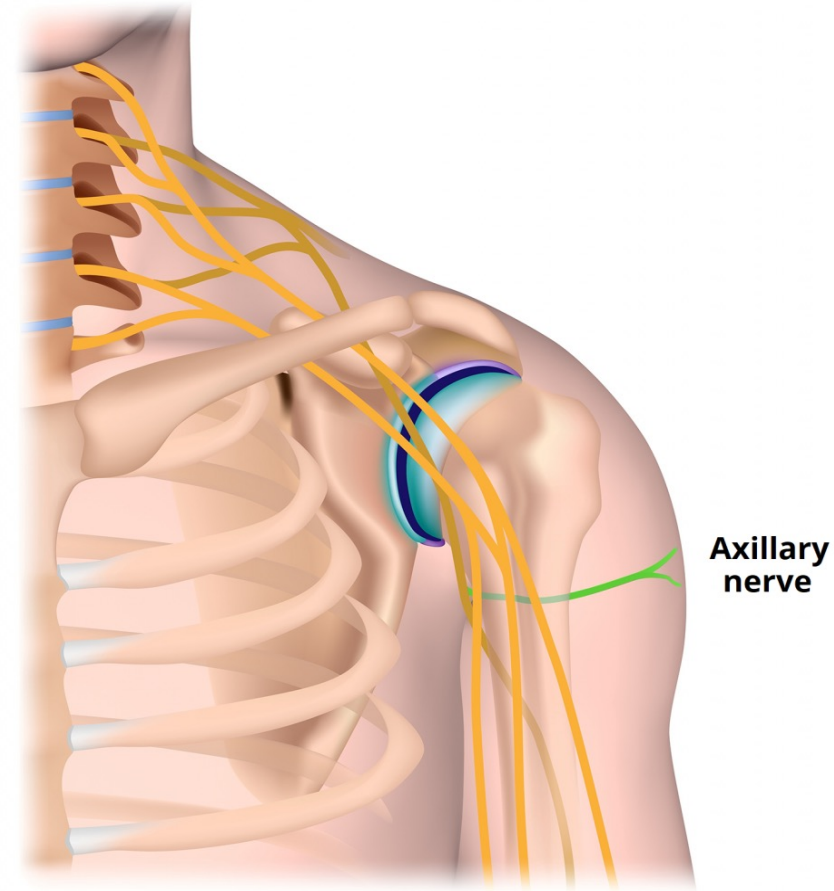
-It arises from posterior cord of the brachial plexus.

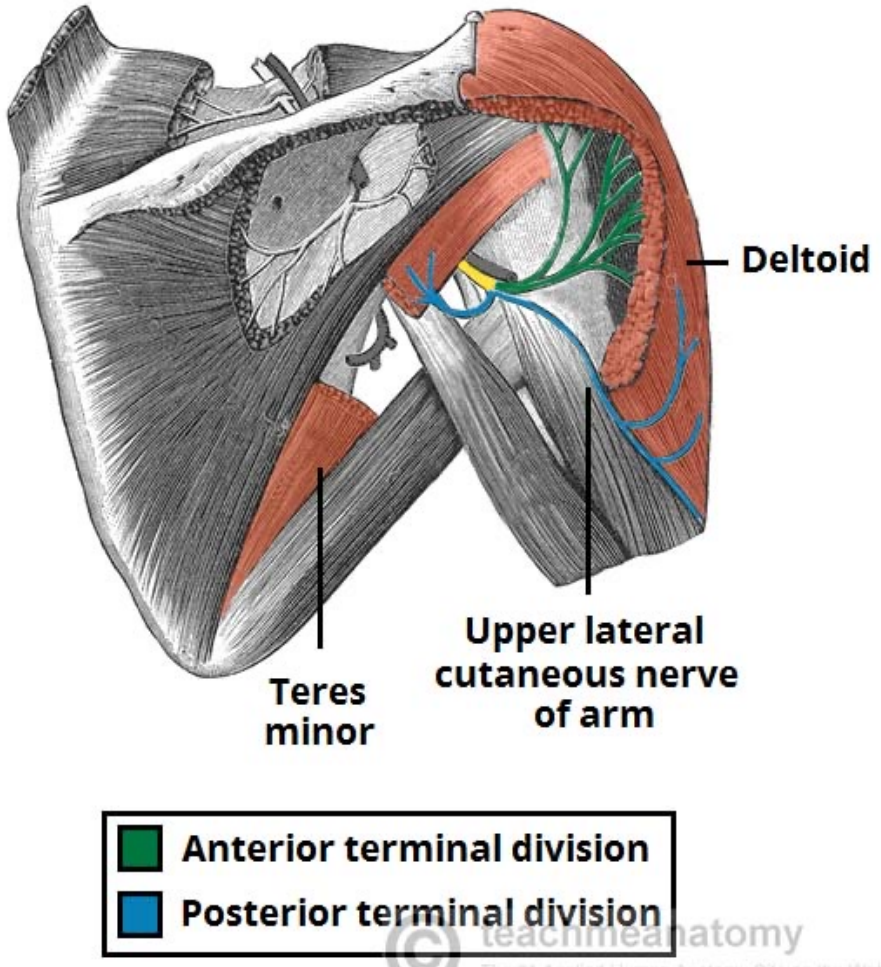
-It winds around **surgical neck of humerus**

-It ends under deltoid muscle by dividing into anterior and posterior terminal branches

Branches

Motor	Sensory
Deltoid and teres minor muscles	To skin over the lower half of deltoid muscle.





Axillary Nerve Injury

A-Causes

1-Compression by a Cruch

2-Fractures of surgical neck of humerus

B-Manifestation :

Loss of power of abduction at the shoulder.

C-Deformity:

Atrophy of the shoulder

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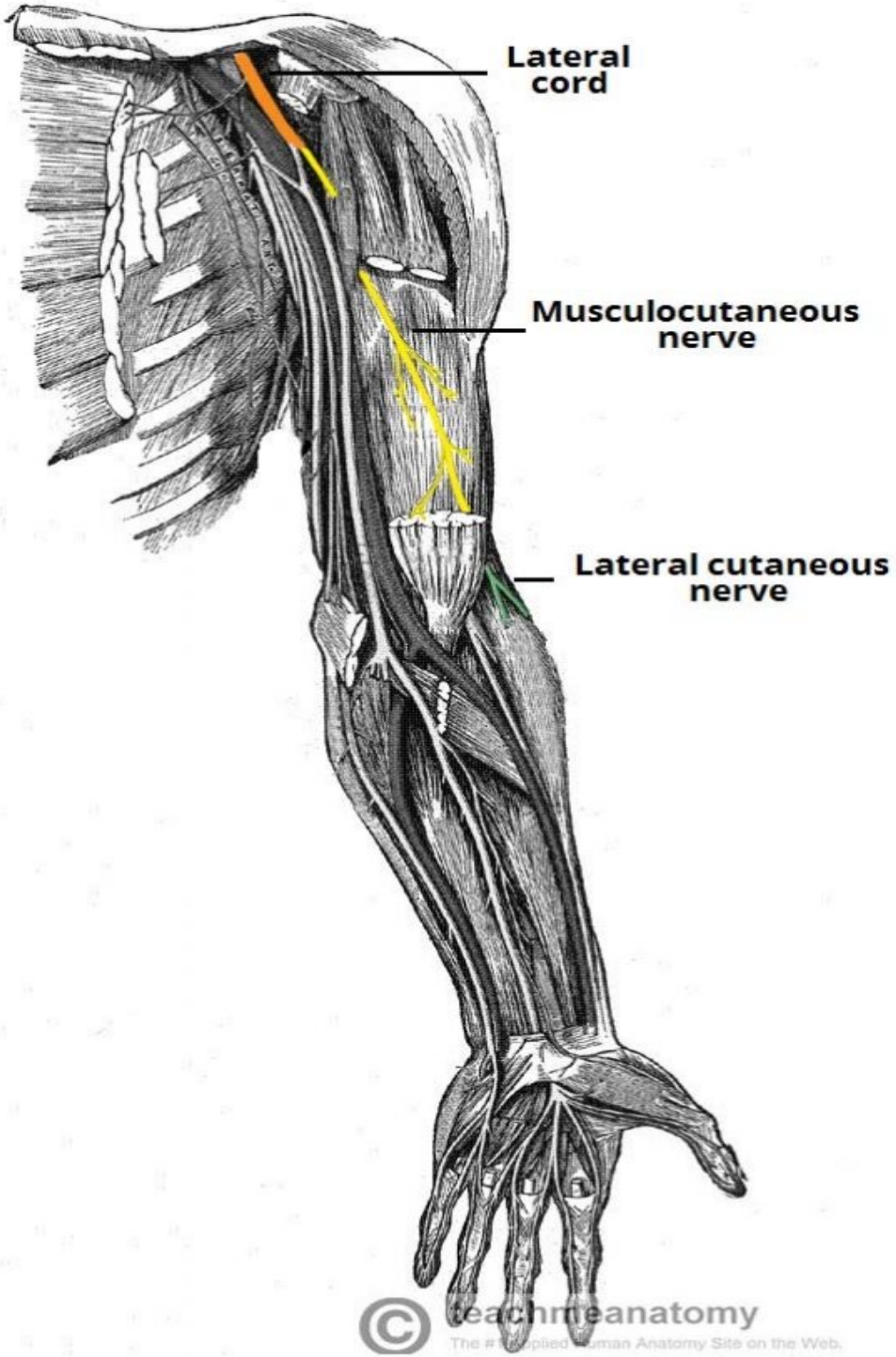
Musculocutaneous nerve

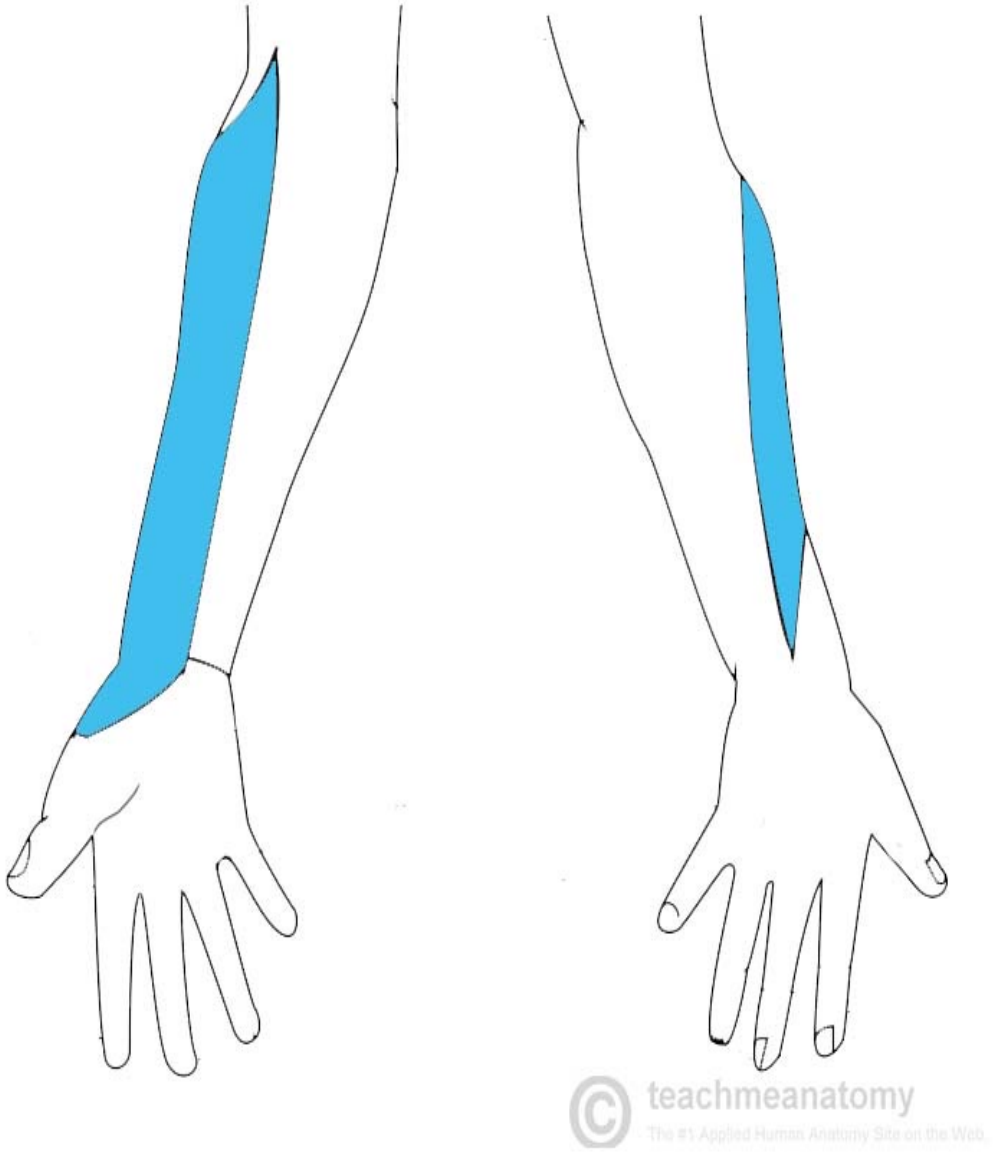
Course:

It Arises from lateral cord of brachial plexus

It ends as lateral cutaneous nerve of the forearm.

Motor	sensory
To coracobrachialis , biceps and brachialis	**lateral cutaneous nerve of the forearm:** supplies the skin of the lateral side of the forearm





Sensory innervation

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Long Thoracic nerve Injury

Paralysis of Serratus anterior muscle

Winging of scapula

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Brachial plexuses injury

Upper trunk lesion (C5, 6)
(Erb-Duchenne palsy or paralysis)

Causes

1- During Labour :

-Pressure of a forceps used in difficult labour.

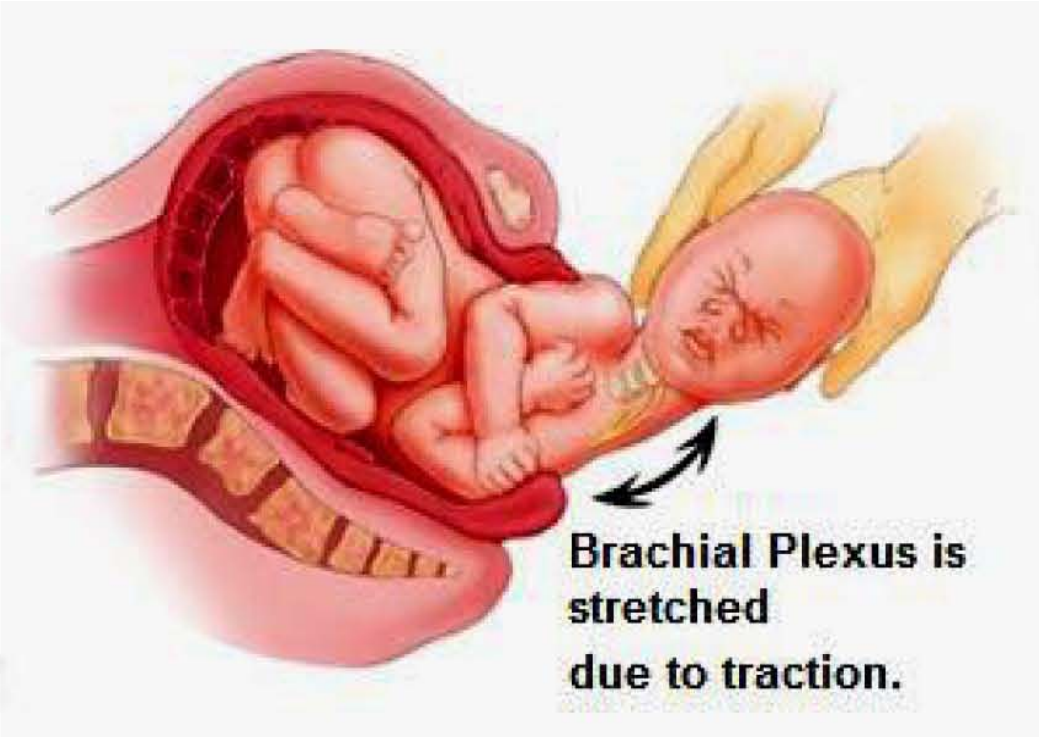
-Traction of the head in breech presentation.

2- Violent falls on the side of the head and shoulder

3- blow at the root of the neck

Affected Nerves:

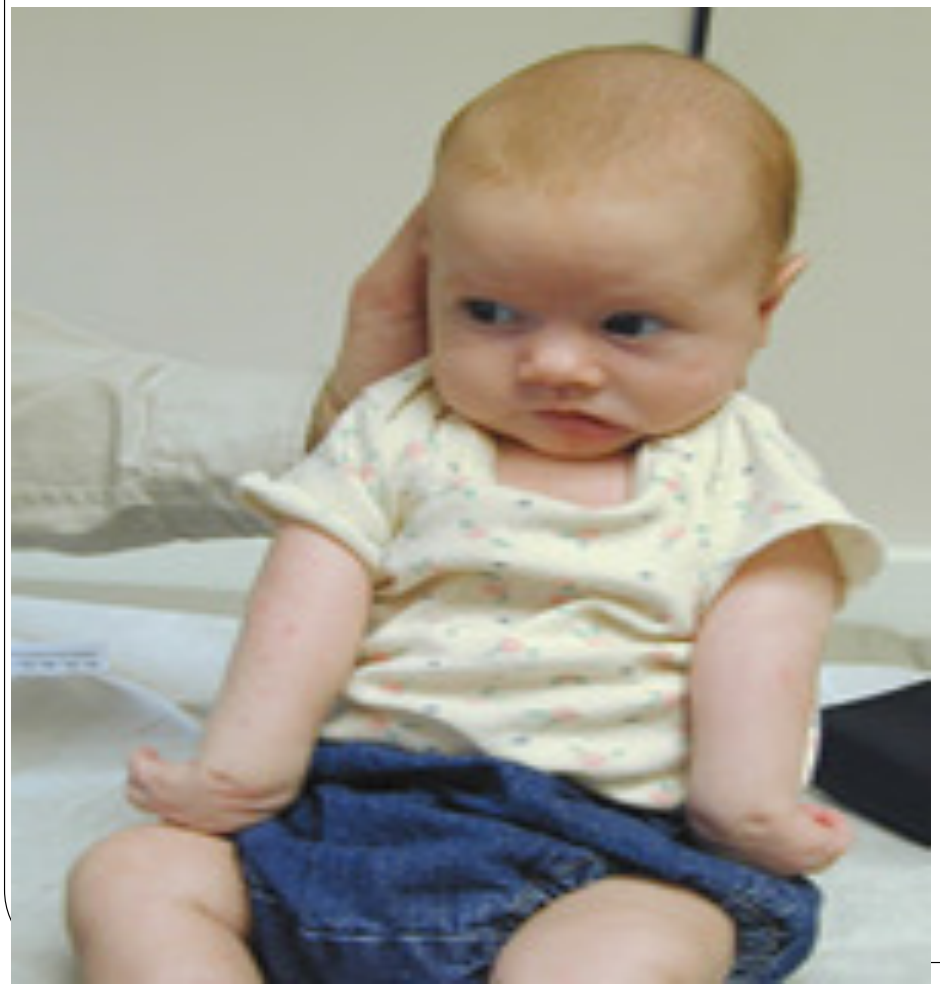
- Suprascapular.
- Nerve to subclavius.
- Musculocutaneous.
- Axillary.



Manifestation

The deformity : police man’s tip position

The upper limb is adducted and medially rotated with extended elbow and pronated forearm



Lower trunk lesion (C8, T1) (Klumpke's palsy or paralysis).

Causes:

Excessive abduction of the arm as Birth difficulty.

Affected nerves:

1st thoracic nerve

Motor effect : paralysis of

All intrinsic muscles of the hand mainly lumbricals and interossei

The deformity

Complete claw hand


Thank
you